Apparently false-positive blood cultures due to autolyzed *Streptococcus pneumoniae*

In the December issue, Meesen and colleagues [1] reported a case of false-positive blood cultures (a positive signal from the instrument with no organism visible in the Gram stain smears and sterile subcultures) in an immunocompromised patient, this was attributed to a high leukocyte count. We present a case of initially false-positive blood cultures in a cancer patient with a positive pneumococcal antigen from the blood culture bottles. A 71-year-old woman was hospitalized with 3 days of fever and progressive dyspnea. She had a history of non-insulin-dependent diabetes mellitus and colonic cancer (Dukes' D stage) diagnosed 2 years previously, with locoregional progression at the time of admission. Initial evaluation disclosed an afebrile but critically ill patient with tachypnea and rales in the lower right thorax. Her white blood count was 16.5×10^9/L (88.5% neutrophils) and a chest X-ray showed an alveolar infiltrate in the right median lobe. No respiratory specimens were available because the patient was not able to expectorate, but three sets of blood cultures were drawn (BacT/Alert standard bottles) and empirical treatment with cefuroxime (1.5 g intravenously twice a day) was started. After a mean incubation time of 10.6 h (ranging from 10.2 to 11 h) the six bottles were flagged as positive by the BacT/Alert system (Organon Teknika, Barcelona, Spain). Gram stain smears and subcultures of the bottles were carried out the following morning (about 11 h later). No bacteria were seen in the Gram stains and subcultures from both aerobic and anaerobic bottles remained sterile. False-positive signals were considered, but the shapes of the curves of growth index were indistinguishable from those observed during bacterial growth. Pneumococcal autolysis was then suspected and a specific antigen latex agglutination assay (Slidex Pneumo-Kit, BioMérieux, Madrid, Spain) performed from the supernatant of the centrifuged blood cultures showed a positive result in the six bottles tested. The patient received 14 days of cefuroxime, recovered uneventfully and was discharged with the diagnosis of probable pneumococcal pneumonia.

Blood cultures are an essential part of the laboratory evaluation of any patient suspected of having a serious infection, especially in immunocompromised patients. *Streptococcus pneumoniae* is a well-known cause of severe infection in this group of patients [2]. Pneumococci are known to be subject to self-destruct processes in liquid cultures due to autolysins such as N-acetyl-muramyl-L-alanine amidase [3], and therefore are known to be a cause of false-positive blood cultures, as previously described [4–6]. This phenomenon is associated with delayed subculturing of positive bottles [4,7].

Continuous monitoring of agitated culture bottles systems, like the BacT/Alert system, increase the recovery of bloodstream pathogens [8,9]. However, in this system spontaneous autolysis occurs more quickly when using standard aerobic and anaerobic bottles, as in our case, probably in relation to the speed of growth or medium composition. Casetta et al. have demonstrated that the use of FAN bottles prevented autolysis of pneumococci [7]. There are no available data on this problem with the BACTEC 9240 system and BACTEC ^{PLUS}/F bottles, although it has been reported that delayed entry of inoculated bottles affects the sensitivity of the BACTEC instrument in that the detection rate of micro-organisms was significantly lower [10].

Rapid diagnosis of pneumococcal bacteremia is required in order to optimize therapy. One of the most frequently used assays is the detection of pneumococcal capsular antigen in blood cultures by latex agglutination (LA) [11–15]. The overall sensitivity of the different reports is 92% (ranging from 88.3 to 100%) and the overall specificity is 92.5%, between 83.3 and 100%. Our personal experience is comparable [16], showing 100% sensitivity and specificity with 84 positive blood cultures tested (64 pneumococci, 14 viridans streptococci, three enterococci, two *Strep. agalactiae* and one *Staphylococcus aureus*) and with 67 experimentally seeded blood cultures with organisms from our collection (30 pnemococci, nine viridans streptococci, three enterococci, six coagulase-negative staphylococci, two *Staph. aureus*, one *Corynebacterium* spp., two *Haemophilus* spp., 11 enterobacteria, two *Pseudomonas* spp. and one *Candida* spp.). Moreover, the test remains positive even when there are no viable bacteria in the blood cultures [5,6,11].

It would be of interest to know if a LA test was performed in the case presented by Meesen and colleagues [1], in order to rule out the possibility of false-positive blood cultures due to autolyzed pneumococci, especially when considering one of the cases reported by Adeniyi-Jones et al. [4]. The patient, who had a high leukocyte count (145×10^9/L), had four aerobic cultures detected as true false-positive and another bottle flagged positive with no bacterial growth, but with evidence of pneumococcal autolysis.

False-positive blood cultures may be due to autolysis of *Strep. pneumoniae* in the culture media. Rapid subculturing of positive signaled bottles might prevent this infrequent phenomenon and should be done whenever possible. However, when pneumococcal autolysis in blood culture media is suspected it must be ruled out. Since LA assays are rapid and accurate, and

do not require the presence of viable organisms, they provide a useful tool when evaluating possible false-positive blood cultures.

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